




# **RADIATION SAFETY INFORMATION FOR VISITORS**

*R. P. Form # 31  
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**Fermi National Accelerator Laboratory** / Kirk Road and Pine Street / P.O. Box 500 / Batavia, IL 60510  
 Office of Science / U.S. Department of Energy / Managed by Fermi Research Alliance, LLC

I acknowledge that I have been provided with information and given the opportunity to ask questions regarding the radiation hazards that I may encounter during my visit at Fermilab.

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Print Name

Signature \_\_\_\_\_ Date \_\_\_\_\_

<i>Escort Name</i>	<i>Signature</i>	<i>ID#</i>
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Area(s) to be Entered	Radiological Area?	If yes, estimated dose.
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Pocket Dosimeter Assigned? ☐ Yes ☐ No #

Dosimetry Badge Assigned? ☐ Yes ☐ No #

If area(s) to be entered are posted radiological areas, Area RSO must review and approve tour.

Area RSO Name	Signature	ID#
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**Please return completed forms to Division/Section ES&H Department.**

## AS LOW AS REASONABLY ACHIEVABLE (ALARA)

The ALARA concept is the foundation of Fermilab's radiological control program. The ALARA concept can be defined as minimizing exposure, both on-site and off-site, to radiation and radioactive materials. There are many methods by which exposure can be minimized, often utilizing one or more of the basic principles of radiation protection: time, distance, and shielding. When visiting our facilities, you can help to minimize your exposure by keeping these principles in mind.

Time – Reduce the amount of time spent near a source of radiation.

Distance – Stay as far away from the source of radiation as possible.

Shielding – Place shielding material between you and the source of radiation.

## EMERGENCIES

To report an emergency of any kind on the Fermilab site, dial extension 3131 on any Laboratory telephone.

## FURTHER QUESTIONS

This information about radiation and radiation safety is intended to give you a better understanding of radiation and help you to have a safe visit.

**The decision to tour Fermilab facilities is entirely yours.**

If you have any questions about the materials contained in this handout, ask your escort, the Area Radiation Safety Officer (RSO), or a member of the ES&H Section. Local telephone extensions are listed below.

Accelerator Division	x4570
Business Services Section	x8386
Computing Division	x8493
Facilities Engineering Services Section	x8386
Particle Physics Division	x4407
Technical Division	x5424
ES&H Section	x8386, x4939

The biological effect of radiation is measured in units called rem, a relatively large unit. The biological effect of radiation is usually reported in subunits of rem called millirem (mrem). The pie chart below shows the relative amounts of background radiation from natural and manmade sources to an average member of the U.S. population. The total dose from natural and manmade sources is about 620 mrem per year.

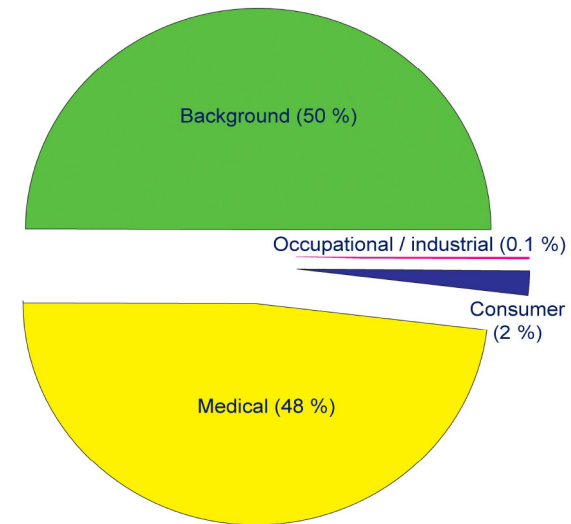


Figure 1 NCRP Report 160, 2009

## SOURCES OF RADIATION AT FERMILAB

The accelerated particles, or particle beams, produced in the accelerators are one source of radiation at Fermilab. The beam will be "locked out" in the area you are visiting to prevent it from operating and directly exposing you to it.

However, some of the accelerator components at Fermilab have become radioactive as a result of their operation. During normal operation, a small part of the beam gets separated from the rest of the beam. The collision of the lost particles with the materials in the surrounding area causes these materials to become radioactive. Radioactive materials are carefully labeled and controlled by personnel who have received training in handling such materials. Some of these same people may also be using specially manufactured radioactive sources to test instrumentation utilized in the experiments.

## AREAS CONTROLLED FOR RADIOLOGICAL PURPOSES

There are areas at Fermilab where a person can be exposed to radiation or radioactive materials at levels above natural background. These areas are designated as radiologically controlled areas and may be posted with signs such as Controlled Area, Radioactive Materials, Radiation Area, High Radiation Area, and Contamination Area. These areas are identified by posting signs with the radiation symbol in black or magenta on a yellow background.



Figure 2 International Radiation Symbol

As a visitor to the site, you are not to proceed beyond any area controlled for radiological purposes without a properly trained escort. You are not permitted to handle any radioactive material. While in an area controlled for radiological purposes, you must be escorted at all times and obey any instructions from your escort, posted signs, or representatives of the radiological control organization. Should you choose not to obey these instructions, you will be asked to leave.

## BIOLOGICAL EFFECTS

Biological effects vary depending on the type of radiation, the energy of the radiation, the portion of the body exposed, and the duration of the radiation exposure.

From your visit to Fermilab, you will probably receive much less than 10 mrem. This quantity is less than the dose equivalent you would receive from one chest X-ray or a transcontinental flight. No permanent harmful effects have been observed at doses of 5000 mrem/year or less in studies of radiation workers.

Genetic effects are those that may appear in one's children conceived after the exposure of the reproductive cells. The Department of Energy and Fermilab, through dose limits and administrative controls, limit the probability of these effects to a level that is considered acceptable when compared to the risks associated with our daily activities and occupations.

Another area of concern is that of prenatal exposure. A developing embryo/fetus is considered to be in the most radiosensitive stage of human development. Exposure of the embryo/fetus to significant doses of radiation (greater than 15,000 mrem) may increase the child's chances of impaired physical growth, slower mental development, or childhood cancer. Again, through the use of dose limits and administrative controls, the risk is virtually eliminated.

## DOSIMETRY

The Department of Energy limits visitors to 100 mrem/year from their activities at Fermilab and other radiological facilities. Even if you do enter a Controlled Area, the amount of exposure you will receive during your visit will be a small fraction of this, probably less than 10 mrem. However, if you are going to enter an area posted as a Radiation, High Radiation or Contamination Area, Fermilab is required to document your visit and monitor possible exposure to radiation.

To monitor for radiation, your escort will issue you one or more radiation monitoring devices. These do not protect you from radiation, but simply measure it. These devices must be returned to your escort at the completion of your visit. You may ask your escort for information as to how you can obtain a summary report of the radiation exposure you may have received during your visit.

These devices should be worn on the front of the body between the neck and waist, to provide the most accurate monitoring of whole body dose.

Your escort has been instructed to keep your exposure As Low As Reasonably Achievable (ALARA).